1.5-Degree lifestyles

- An absolute reductions trajectory towards 2050 climate goals -
What is *the* question again?

To be or not to be?

To have or not to have?

To be or to have?
Why do people consume?

• People do not intentionally harm the environment;
• environmental impact is an unintended consequence of pursuing well-being!

• to meet essential needs
• to meet social expectations
• to satisfy personal desires
• because they are railroaded and urged to
Flattening and merging trends

- Between consumption and production
- Between social trends and individualization
- Ownership structure
- Merging of online and offline living
- Merging of work and private life
- Information use and knowledge
- Traditional services and digital
Challenge: link lifestyles to climate action

- Many climate scenarios based on energy systems and effects of future tech
- Touching consumption is a hot-potato issue
- Debate focused so far rather on territorial emissions than value-chain-wide footprints
- Consumer scapegoatism done through green consumerism and awareness raising

Translating the Paris Agreement into lifestyles

Project approach:
- Current carbon budget
- Hot spots (carbon footprint) of current lifestyles
- Targets (lifestyle carbon footprints) for 2030, 2040, 2050
- Reduction potentials for various lifestyle changes
Review of emission scenarios

Criteria of scenario selection

- Emission pathway to 2 °C goal with at least 66% probability or 1.5 °C goal with at least 50% probability.
- Addresses demand-side measures, utilization of renewable energy, and covers emission reduction across all sectors.
- Provides a quantified estimate of a carbon budget on a time scale up to year 2100.
- Aims to limit atmospheric GHG concentration at 430–480 parts per million (ppm) CO$_2$eq for 2 °C target and 430–450 ppm CO$_2$eq for 1.5 °C target (in 2100)
- Estimates a cumulative carbon budget at 350–950 GtCO$_2$ for 2 °C target and less than 350 GtCO$_2$ for 1.5 °C target (2011–2100)
- Covers all Kyoto GHGs (CO$_2$, CH$_4$, N$_2$O, HFCs, PFCs, and SF$_6$) in its estimation.
- Explains the assumptions of “human carbon sink” utilisation

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Description</th>
<th>Reference</th>
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<tbody>
<tr>
<td>1.5S</td>
<td>Pathway to the 2 °C target with 75% probability and the 1.5 °C target with 50% probability, considering the use of all sinks starting before year 2050</td>
<td>Rockström et al., 2017</td>
</tr>
<tr>
<td>2S</td>
<td>Pathway to the 2 °C target with more than 66% probability, considering the use of CCS technologies</td>
<td>Rogelj et al., 2011</td>
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<tr>
<td>1.5D (a)</td>
<td>Pathway to the 1.5°C target with 60% probability, without the use of CCS</td>
<td>Ranger et al., 2012</td>
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<tr>
<td>1.5D (b)</td>
<td>Pathway to 1.5°C target with stringent measures to reduce end-of-pipe emissions and non CO2 GHG emissions</td>
<td>Van Vuuren et al. 2018</td>
</tr>
<tr>
<td>1.5D (c)</td>
<td>Pathway to 1.5°C target with land sector sequestration, increased efficiency, renewable electricity, agricultural intensification, low non-CO2 emissions, lifestyle changes, and low population growth</td>
<td>Van Vuuren et al. 2018</td>
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</table>
Lifestyle Carbon Footprints

• Footprints are consumption-based accounting of environmental impacts both including direct emissions and indirect emissions via purchases of products/services

• LCF defined as “GHG emissions directly emitted and indirectly induced from household consumption excluding those induced by government consumption and capital formation”
Estimation of lifestyle carbon footprints

\[
\text{Lifestyle Carbon Footprints} = \sum_i \text{Nutrition footprint} + \text{Housing footprint} + \text{Mobility footprint} + \text{Goods footprint} + \text{Leisure footprint} + \text{Services footprint}
\]

\[
= \sum_i \text{Nutrition intake} \times \text{GHG intensity}^i
\]

\[
+ \sum_j \text{Energy demand} \times \text{GHG intensity}^j
\]

\[
+ \sum_k \text{Mobility distance} \times \text{GHG intensity}^k
\]

\[
+ \sum_l \text{Goods consumption} \times \text{GHG intensity}^l
\]

\[
+ \sum_m \text{Leisure consumption} \times \text{GHG intensity}^m
\]

\[
+ \sum_n \text{Service consumption} \times \text{GHG intensity}^n
\]

Notes: Units of currency should be Euro, Japanese Yen, or other local currencies.
Current: 4.5-5 ton/cap/year GHG from household consumption

Household footprint share is assumed as 72%.

Carbon footprint targets per capita for 2° and 1.5° goals:

- 3 (2.5-3.2) ton by 2030
- 2 (1.4-2.2) ton by 2040
- 1 (0.7-1.5) ton by 2050
<table>
<thead>
<tr>
<th>Country</th>
<th>Current Footprint</th>
<th>Target Footprint</th>
<th>Reduction</th>
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</thead>
<tbody>
<tr>
<td>Finland</td>
<td>2060</td>
<td>1230</td>
<td>430</td>
</tr>
<tr>
<td>Japan</td>
<td>2790</td>
<td>1550</td>
<td>1240</td>
</tr>
<tr>
<td>China</td>
<td>1050</td>
<td>1030</td>
<td>20</td>
</tr>
<tr>
<td>Brazil</td>
<td>480</td>
<td>470</td>
<td>10</td>
</tr>
<tr>
<td>India</td>
<td>1030</td>
<td>700</td>
<td>330</td>
</tr>
</tbody>
</table>

**Footprint gap**

Current and Target Per-Capita Lifestyle Carbon Footprint (for 1.5 degree limit)

- **2030 Target**: ~3 ton/cap/yr
- **2050 Target**: ~1 ton/cap/yr

Source: IGES, Aalto University, D-mat
Belgium: Lifestyle Carbon Footprints

Carbon Footprints

- **Food**: 14%
- **Housing**: 25%
- **Goods**: 24%
- **Mobility**: 25%
- **Others**: 17%

Lifestyle Carbon Footprints

- **Current**: 12.2 tCO₂e/cap
- **2030 target**: 2.5 tCO₂e/cap
- **2050 target**: 0.7 tCO₂e/cap


Current Footprint: Nutrition

High consumption of dairy products (21%, 200kg/cap/yr)

Moderate intake of high intensity meat products (40kg/cap/yr)

High intake of cereals and vegetables (approx 20%, each).
Current Footprint: Nutrition

Carbon Footprint (kgCO₂e%): 1,750 kgCO₂e/cap/year (outer circle)

Food Demand (kg%):
- Meat
- Cereals
- Fish
- Beverage
- Dairy
- Others
- Vegetables
- Fruits
- Eggs
- Beans

Carbon Footprint (kgCO₂e%): 1,400 kgCO₂e/cap/year (outer circle)

Food Demand (kg%):
- Meat
- Cereals
- Fish
- Beverage
- Dairy
- Others
- Vegetables
- Fruits
- Eggs
- Beans

Finland: 940 kg-food/cap/yr (inner circle)

Japan: 800 kg-food/cap/yr (inner circle)
Current Footprint: Housing

Large living space (40m²) and high heating demand

Moderate heating demand but high share of fossil-fuel-based energy sources
Current Footprint: Housing
Current Footprint: Mobility

Very high share of car use (70%) causing 2.2 tCO₂e

Moderate share of car (40%) causing 1.2tCO₂e and higher share of public transportation (34%)
Current Footprint: Mobility

Carbon Footprint (kgCO₂e%): 2,790 kgCO₂e/cap/year (outer circle)

Mobility Demand (passenger km %):
- Finland: 16,500 km/cap/yr (inner circle)
- Japan: 11,000 km/cap/yr (inner circle)

- Car: 68%
- Airplane: 42%
- Train: 5%
- Bus: 5%
- Other private: 5%
- Ferry: 3%
- Bicycle: 22%
- Walking: 22%

Carbon Footprint (kgCO₂e%): 2,430 kgCO₂e/cap/year (outer circle)

Mobility Demand (passenger km %):
- Finland: 16,500 km/cap/yr (inner circle)
- Japan: 11,000 km/cap/yr (inner circle)

- Car: 46%
- Airplane: 46%
- Train/metro: 5%
- Bus: 5%
- Motorcycle: 3%
- Ferry: 15%
- Bicycle: 15%
- Walking: 28%
Three Key Approaches to low-carbon lifestyles

- **Absolute reductions**: reducing physical amounts of goods or services consumed, as well as avoiding unsustainable options.

- **Efficiency improvements**: decreasing emissions by replacing technologies with lower-carbon ones while not changing the amount consumed or used.

- **Modal shifts**: changing from one consumption mode to a less carbon intensive one.
Estimated Impacts of Low-Carbon Options: Nutrition (Finland)

Partial adoption impacts = full implementation impacts x adoption rate

a) Nutrition, Finland

- Vegan diet
- Vegetarian diet (lacto-ovo)
- Plant-based instead of dairy products
- Low-carbon protein instead of red meat
- Reduction of sweets and alcohol
- Food production efficiency improvement
- Food loss reduction (supply side)
- Food loss reduction (household side)

Estimated per-capita carbon footprint reduction impacts (kgCO₂e/capita/year)

- 15% adoption rate
- 30% adoption rate
- 65% adoption rate (2S target)
- 75% adoption rate (1.5C target)
- 100% adoption rate
What the numbers say:

• Long-term targets for lifestyle carbon footprints compatible with the 1.5 °C aspirational target under Paris Agreement are: 2.5, 1.4, & 0.7 tCO$_2$e per capita for 2030, 2040, and 2050.

• Developed countries need to reduce lifestyle carbon footprints 60-80% by 2030, and 80-90% by 2050. Emerging economies need ambitious reduction of 25-80% by 2050.

• Nutrition, housing, and mobility tend to have the largest impact (approximately 75%) on total lifestyle carbon footprints; these areas therefore offer high potential for impactful intervention.

• The range of footprint reductions required for the developed countries for 2030 (2050) are at least 47% (75%) in nutrition, 68% (93%) in housing, and 72% (96%) in mobility.
• We need to give up some things!
  • sooner rather than later
  • Avoid the small-action trap!

• Large, unprecedented undertaking of capacity development
  • For individuals and change organizations
  • To imagine life differently and to accept radical solutions
  • Techno-optimism is not sufficient

• New institutions
  • including new business models
  • Find solutions beyond the markets
  • Completely new approaches to meeting needs and wants
The ring of lifestyles

The context of consumption and lifestyles

Akenji & Chen (2016) A framework for shaping sustainable lifestyles: determinants and strategies. UNEP
Some reflections on the study and its implications
1.5-Degree Lifestyles
Targets and options for reducing lifestyle carbon footprints

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Thank you

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Report is available at:
• IGES: https://pub.iges.or.jp/pub/15-degrees-lifestyles-2019
• Aalto University: https://www.aalto.fi/department-of-design/15-degrees-lifestyles
• Hot or Cool network: https://hotorcool.org/publications/15-degree-lifestyles-report-2019